Ressources MeCS

Plateforme MatriCS

The MatriCS platform pools scientific equipment for digitization, high-performance computing, storage, visualization and interaction. The goal is to serve the research and the socio-economic world a single place of ressources in digital science. It offers the 2D (documents, …) and 3D digitals (monuments, lands, …) and train students and staff of the University and manufacturers to use the equipment and softwares of the platform. The MatriCS platform fall within multidisciplinary context and it serves all laboratories of the platform such as MIS, EPROAD and LTI (Informatic), LAMFA (Mathematic), LRCS (Battery), LG2A (Chemistry), GEC and EDYSAN (Biology) or LNFP (Medicine)

The MatriCS platform offers a humanoid robot Pepper, 3D scanner laser, a 3D-light-field camera and a visualization server with 2 GPUs and softwares such as Faro Scene, ANSYS softwares, Optistruct or Abaqus … The main equipment of the platform is a computer cluster. In order to answer a lot of needs, the cluster has several kinds of nodes : "Normal" nodes, nodes with a lot of memories for researches asking a lot of memories in calculations, nodes with 2 GPUs for HPC software such as Gromacs or Lammps, nodes with 4 GPUs for Artificial Intelligence -in particular for deep learning, nodes for visualizing and interacting with results. The calculator has a lot of computational nodes and one visualization node.

These computational nodes are :

- 48 thin nodes – 28 cores and 128Gbs of RAM
- 12 thick nodes – 28 cores and 512 Gbs of RAM
- 6 bi-gpu nodes – 40 cores and 384 Gbs of RAM and 2 GPUs (Tesla V100-32G)
- 2 quad-gpus nodes – 40 cores and 768 Gbs of RAM and 4 GPUs (Tesla V100 SXM2-32G-NVLINK)

All nodes are bi-processors. For example, a node with 28 cores has 2 processors with 14 cores. The processor is Intel Xeon CPU E5-2680 v4 @ 2.40GHz for cpu nodes and Intel Xeon Gold 6148 CPU @ 2.40 GHz for gpu nodes. All nodes are connected by ethernet (SFP 10Gbs) and omnipath.

The computational platform has 68 computational nodes which cumulate 2,000 cores, 16.128Tbs and 20 GPUs. Moreover, the MatriCS platform hosts 8 computational nodes in the context of the ARTISTIC project.

- 8 middle nodes – 40 cores and 384 Gbs of RAM

Therefore, it includes 76 nodes with 2,320 cores, 19.2 Tbs of RAM and 20 GPUs

The computational power is estimated at 80TFlops without GPU nodes and 225 TFlops with GPUs.

The visualization node is composed of 36 cores and 192 Gbs of RAM and 1 GPU (Tesla P40).

- 1 visualization node - 36 cores and 192 Gbs of RAM and 1 GPU (Tesla P40)

There are 2 processors which are Intel Xeon Gold 6150 CPU @ 2.70 GHz. The nice dcv 2017 software is currently installed on this node and we can use different visualization tools such as paraview, ovito or pymol. No computational node and no visualization node is hyperthreaded.

For a complete service, the cluster has service nodes which manage the storage, login nodes for the connexion of the users and a head node which manages the cluster. The service nodes are 2 nfs nodes and 2 nodes which manage the /scratch repository (beegfs) The cluster counts 2 login nodes and one head node.

- 4 service nodes
    - 2 for nfs
    - 2 for beegfs
- 2 login nodes
- 1 head node

These nodes are hyperthreaded with 20 cores per node (40 threads) and the processor is Intel Xeon CPU E5-2640 v4 @ 2.40GHz.

The cluster has 2 kinds of storage :

- nfs used for results
- beegfs (Parallel Cluster File System) for calculations in progress.

The storage for results is of 1 storage array of 80 Tbs and 1 storage array of 420 Tbs. Thus, the capacity is of 500 Tbs of storage The storage for the calculation in progress has a capacity of 292 Tbs of storage. The MatriCS platform offers a storage capacity of 792 Tbs.

Several external storages are planned : 1 storage array of 300 Tbs (scalable until 2 Pbs - out for delivery) for the Next Cloud Research of the University and a server with hard disks for saving at least 80 Tbs of the MatriCS platform.

The current OS is CentOS 7.6. The job scheduler is slurm. The softwares are installed through module environment. There are several softwares such as gromacs, lammps, magma, freefem, tensorflow,... The Engine Frame for HPC software is currently installed for offering a graphical human interface for submitting friendly jobs.

Ancien <s>Calculateur : UV100</s>

Ce calculateur SGI a été acquis dans le cadre du CPER 2010-2011.

Caractéristiques Techniques:

- 36 processeurs de 8 cœurs (Intel Westmere Xeon E7-8837) à 2.66GHz, soit 288 cœurs,
- 1,2 To de mémoire,
- Baie de disque : 98 To net RAID 6 (acquise grâce au CPER 2013, à des fonds européens FEDER, ainsi qu'à des fonds de la Région Picardie).

Outil de visualisation : Luzar

Cet outil a été acquis dans le cadre du CPER 2013.

Caractéristiques techniques:

- 2 cartes graphiques GPU Nvidia K6000 / 12 Go
- 2 CPU Intel Xeon 10 cœurs @ 2.5 GHz
- 256Go mémoire @ 1866 MHz
- 6 disques durs 4 To en RAID5

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